Rev.
1.2

OOK/ASK SUPER HETERODYNE RECEIVER + F.E. FILTER 433.92 MHz

Product Code: **32001367**

DESCRIPTION:

Low cost, high performance Super Heterodyne OOK/ASK receiver: thanks to a SAW front-end filter, a performing RF architecture and an efficient embedded noise cancellation filter, a good noise reduction and restoration of received signal integrity are achieved, providing excellent performances.

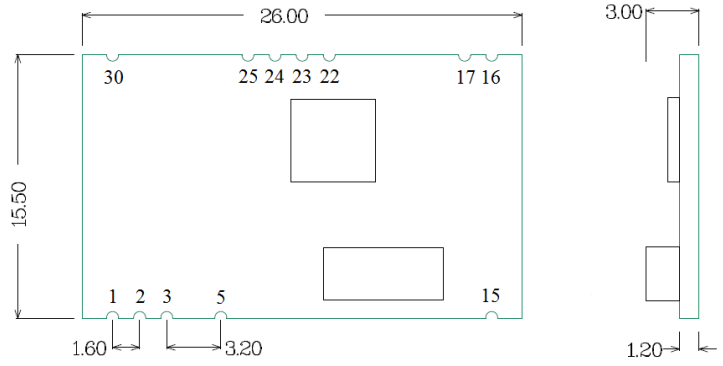
HIGHLIGHTS:

Very low profile with LCC form factor (15.5 x 26 mm).
Thanks to an efficient embedded noise cancellation filter a good noise reduction and restoration of received signal integrity are achieved, providing excellent performances. Suitable for all HCS, HT12 encodings and similar. RSSI output proportional to received signal level.
Wide supply voltage range from 2.1 to 5.5 Vdc.
The module meets all the requirements in the **industrial temperature range -40/+85°C.**
Category 2 receiver developed according to **ETSI EN 300 220** European Standard.
The module meets with the Radio Equipment Directive **(RED) 2014/53/EU.**
Compliant with **REACH** and **RoHS** directives.

APPLICATIONS:

Security systems, data transmission, industrial controls, home automation, etc.

MECHANICAL CHARACTERISTICS



ALL DIMENSIONS ARE IN MILLIMETERS
GENERAL TOLERANCE +/-0.1MM

Pin functions:

1 = GND
2 = RF Input (50 Ω)
3 = GND
5 = NU
15 = GND
16 = GND
17 = +Vcc
22 = RSSI Out
23 = Data OUT
24 = RX_ENABLE
25 = NU
30 = GND

ABSOLUTE MAXIMUN RATINGS

Supply voltage, +Vcc, pin 17:	5.5 V
Radio Frequency Input, pin 3:	10 dBm
Output pins voltage with respect to GND:	+Vcc
Storage Temperature (excl. package):	-40 ÷ 85 °C
Storage Temperature (incl. package):	-10 ÷ 65 °C
Operating Temperature:	-40 ÷ 85 °C

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Cormons, October 1

PIN DESCRIPTION

Pin	Name	Pin type	Description	Notes
1	GND	Power supply	Ground (0 V)	
2	RF IN	A IN	RF input	
3	GND	Power supply	Ground (0 V)	
5	NU	NC	Not Used – do not connect	
15	GND	Power supply	Ground (0 V)	
16	GND	Power supply	Ground (0 V)	
17	Vcc	Power supply	Power supply	
22	RSSI_OUT	A OUT	RSSI output	
23	DATA_OUT	D OUT	Data Output	
24	RX_ENABLE	D IN	Enable Input (+Vcc: RX, 0 V: Sleep)*	
25	NU	NC	Not Used – do not connect	
30	GND	Power supply	Ground (0 V)	

ELECTRICAL CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
Supply Voltage (Vcc)	2.1	-	5.5	V	
DC Current drain (RX_ENABLE = 1)	-	7.9	-	mA	
Stand-by DC Current (RX_ENABLE = 0)	-	2.7	-	µA	
Operating Frequency	-	433.92	-	MHz	
Sensitivity	-	-114	-	dBm	1
-3 dB RF Bandwidth	-	300	-	kHz	6
-6 dB Selectivity	-		-	kHz	6
-60 dB Selectivity	-		-	MHz	6
Image Frequency Rejection	-		-	dBm	7
Spurious radiated level	-	-	-57	dBm	8
Baud rate	300	2400	4800	Baud	2
Start-up time	-	-	6	ms	3
Wake-up time	-	-	TBD	ms	4
Settling time	-	-	5	ms	5
Output Logic low RX_ENABLE	GND	-	0.1	V	
Output Logic high RX_ENABLE	Vcc - 0.1V	-	Vcc	V	
Output load (pin 23)	50	-	-	kΩ	

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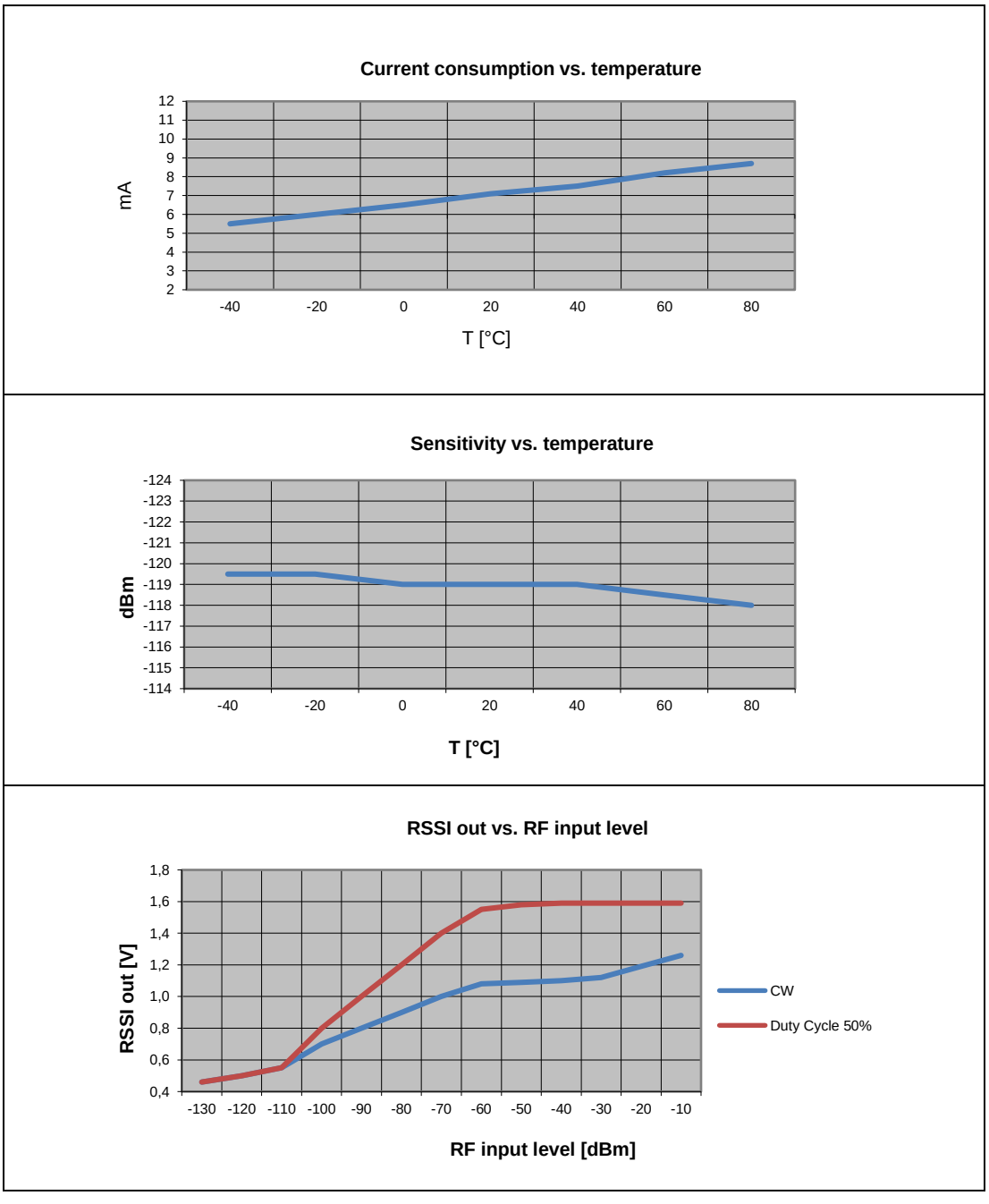
TYPICAL CHARACTERISTICS (*)

Note: All RF parameters measured with input (pin 3) connected to a 50-Ω impedance signal source or load.



(*): All graphs must be considered as indicative typical results in accordance with temperature variation.

Note 1: Test signal AM pseudo random code NRZ (mod. depth 100%) 2400 Baud. Result at BER=10^{-2} or better.
Note 2: Max and min baud rate limits measured with RF level 3 dB above sensitivity limit.
Note 3: Time by power-on (+Vcc on pin 17) to valid data reception.
Note 4: Time by receiver enable (RX_ENABLE = 1) to valid data reception.
Note 5: Time by wanted signal (-20 to -110 dBm) at RF input to valid data reception.
Note 6: All RF parameters measured with input (pin 3) connected to 50-Ω impedance signal source or load.
Note 7: Measured as per ***ETSI 300 220-1, 5.17.3.3 "Spurious response rejection – Conducted measurement"***, test signal ASK 2400 Baud, 100 %, fi @ 412.52 MHz.
Note 8: No significant emission detected. As per ***ETSI 300 220-1, 5.9.3.3.1 "UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN - Conducted measurement"*** *and* 5.9.3.3.2 ***"UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN - Radiated measurement"***; f < 1 GHz: < -57 dBm; f > 1 GHz: < -47 dBm

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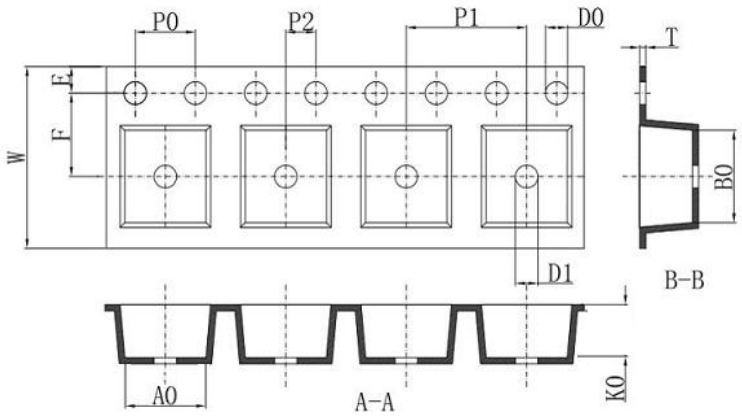
DELIVERY

32001367 modules are delivered in tape/reel packaging including 250 units.



Dimensions are:
W = 44 mm
P = 20 mm
T = 0.35 mm
A0 = 16 mm
B0 = 26.5 mm
K0 = 3.6 mm
D0 = 1.5 mm
D1 = 1.5 mm

STORAGE AND HANDLING

Moisture Sensitivity Level (MSL)

The Moisture Sensitivity Level (MSL) relates to the packaging and handling precautions for devices that are sensitive to moisture-induced stress. The MSL standard is IPC/JEDEC J-STD-020 and can be downloaded from www.jedec.org.
Following table summarizes the dry pack requirements for different MSL levels in the IPC/JEDEC specification.

Dry Pack Requirement	
MSL LEVEL	**Dry Pack Requirement**
1	Optional
2	Required
3	Required
4	Required

According to IPC/JEDEC specification J-STD-020, if a device passes MSL level 1, it is classified as not moisture sensitive and does not require dry pack. If a device fails level 1 but passes a higher level, it is classified as moisture sensitive and must be dry packed in accordance with J-STD-033.

The 32001367 is qualified for MSL level = 3.

Dry Bag

Products with an MSL level of 2 or above are shipped dry packed in a Moisture Barrier Bag (MBB). Carrier materials such as trays, tubes, reels, etc., that are placed in the MBB can affect the moisture level within the dry bag. The effect of these materials is compensated by adding additional desiccant in the MBB to ensure the shelf life of the SMT packages.

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IPC/JEDEC specifications require that MSD sensitive devices be packaged together with a Humidity Indicator Card (HIC) and desiccant to absorb humidity. If no moisture has been absorbed, the three fields in the HIC indicate blue color.

Storage and floor life

The calculated shelf life for dry packed SMT packages is a minimum of 12 months from the bag seal date, when stored in a non-condensing atmospheric environment of <40°C/90% RH.
Following table lists floor life for different MSL levels in the IPC/JDEC specification.

Floor life

MSL level	Floor life (out of bag) at factory ambient ≤ 30 °C / 60 % RH or as stated
1	Unlimited at ≤ 30 °C / 85 % RH
2	1 year
2a	4 weeks
3	168 hours
4	72 hours

The parts must be processed and soldered within the time specified for the MSL level. If this time is exceeded, or the humidity indicator card in the sealed package indicates that they have been exposed to moisture, the devices need to be pre-baked before the reflow solder process.

Drying

Both encapsulate and substrate materials absorb moisture. IPC/JEDEC specification J-STD-020 must be observed to prevent cracking and delamination associated with the “popcorn” effect during reflow soldering. The popcorn effect can be described as miniature explosions of evaporating moisture. Baking before processing is required in the following cases:

- Humidity indicator card: At least one circular indicator is no longer blue
- Floor life or environmental requirements after opening the seal have been exceeded, e.g. exposure to excessive seasonal humidity.

Refer to Section 4 of IPC/JEDEC J-STD-033 for recommended baking procedures. Table 4-1 of the specification lists the required bake times and conditions for drying.

Following table provides a summary of specified recommendations:

Bake Time

		Bake @ 125 °C		Bake @ 90 °C ≤ 5 % RH		Bake @ 40 °C ≤ 5 % RH	
Package Body	**MSL Level**	**Exceeding Floor Life by > 72 h**	**Exceeding Floor Life by ≤ 72 h**	**Exceeding Floor Life by >72 h**	**Exceeding Floor Life by ≤ 72 h**	**Exceeding Floor Life by > 72 h**	**Exceeding Floor Life by ≤ 72 h**
Thickness ≤ 1.4 mm	2	5 hours	3 hours	17 hours	11 hours	8 days	5 days
	2a	7 hours	5 hours	23 hours	13 hours	9 days	7 days
	3	**9 hours**	**7 hours**	**33 hours**	**23 hours**	**13 days**	**9 days**
	4	11 hours	7 hours	37 hours	23 hours	15 days	9 days
	5	12 hours	7 hours	41 hours	24 hours	17 days	10 days
	5a	16 hours	10 hours	54 hours	24 hours	22 days	10 days
Thickness >1.4 mm ≤ 2.0 mm	2	18 hours	15 hours	63 hours	2 days	25 days	20 days
	2a	21 hours	16 hours	3 days	2 days	29 days	22 days
	3	27 hours	17 hours	4 days	2 days	37 days	23 days
	4	34 hours	20 hours	5 days	3 days	47 days	28 days
	5	40 hours	25 hours	6 days	4 days	57 days	35 days
	5a	48 hours	40 hours	8 days	6 days	79 days	56 days
Thickness >2.0 mm ≤ 4.5 mm	2	48 hours	48 hours	10 days	7 days	79 days	67 days
	2a	48 hours	48 hours	10 days	7 days	79 days	67 days
	3	48 hours	48 hours	10 days	8 days	79 days	67 days
	4	48 hours	48 hours	10 days	10 days	79 days	67 days
	5	48 hours	48 hours	10 days	10 days	79 days	67 days

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	5a	48 hours	48 hours	10 days	10 days	79 days	67 days

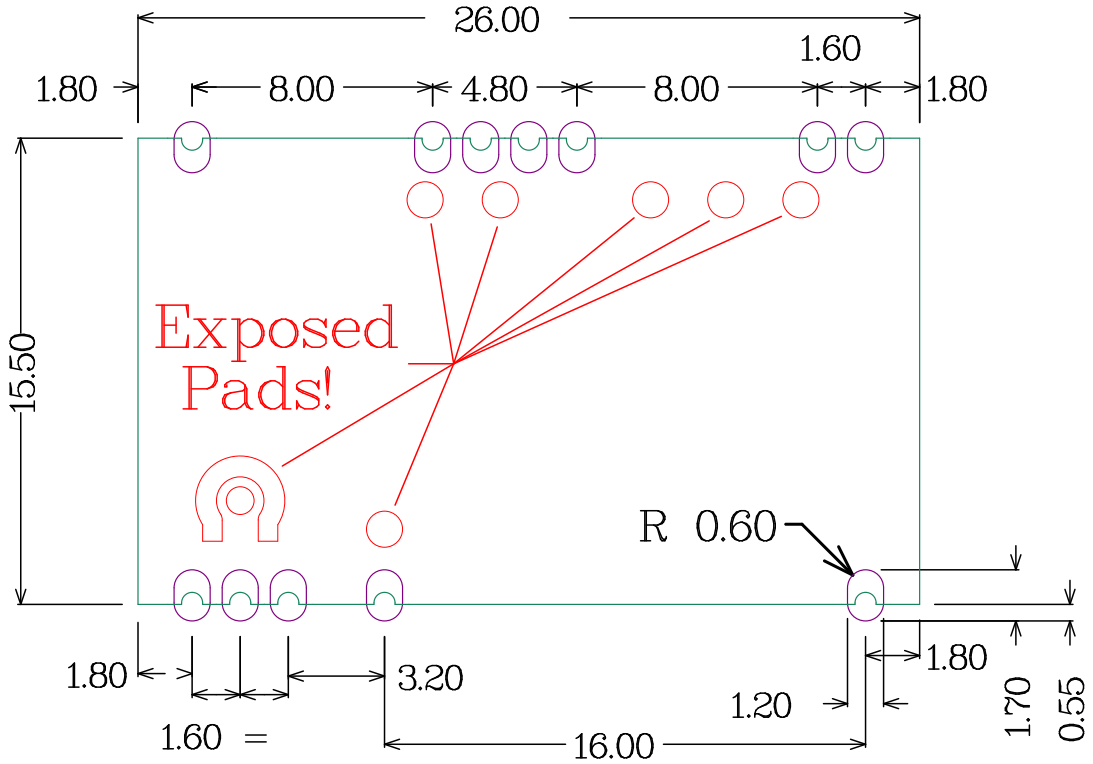
Packages of sensitive components in **32001367 have a thickness ≤ 1.4 mm.**

- **Do not attempt to bake modules at temperatures higher than 60 °C while contained in tape and rolled up in reels. If baking at higher temperature is required, remove modules from packaging and place them individually onto oven tray.**
- **Oxidation Risk: Baking SMT packages may cause oxidation and/or intermetallic growth of the terminations, which if excessive can result in solderability problems during board assembly. The temperature and time for baking SMT packages are therefore limited by solderability considerations. The cumulative bake time at a temperature greater than 90 °C and up to 125 °C shall not exceed 96 hours. If the bake temperature is not greater than 90 °C, there is no limit on bake time. Bake temperatures higher than 125 °C are not allowed.**

SOLDERING INFORMATION

Soldering pad pattern

The finished surface on the printed circuit board pads should be made of Ni/Au.
The recommended soldering pad layout on the host board for the 32001367 is shown in the diagram below (purple lines):



All dimensions in mm

Neither via-holes nor wires are allowed on the PCB upper layer in area occupied by the module.

Solder Paste

32001367 module is designed for surface mounting using half-moon solder joints (see diagram below). For proper module assembly, solder paste must be printed on the target surface of the host board. The suggested solder paste height should be within 150 µm and 180 µm.

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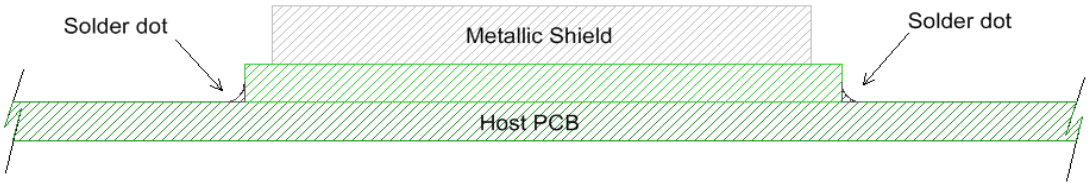
The following diagram shows mounting characteristics for Module integration on host PCB:



Placement

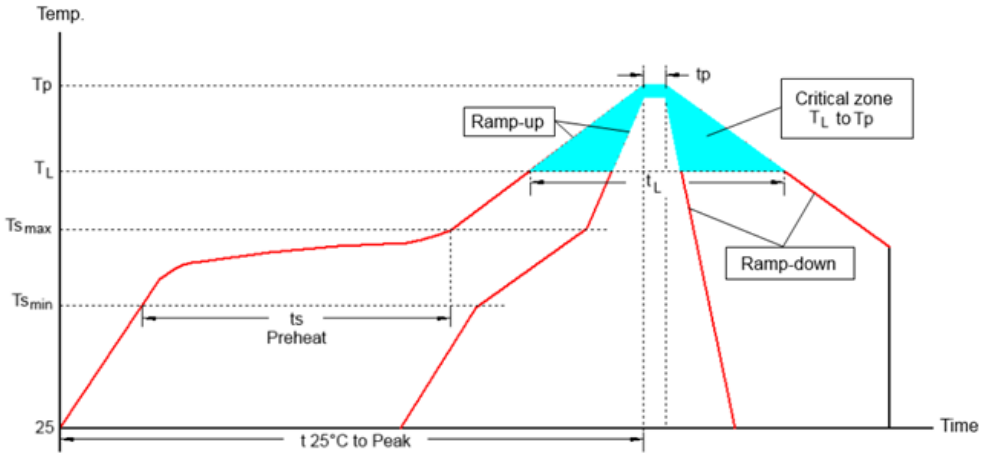
The 32001367 module can be automatically placed on host boards by pick & place machines like any integrated circuit.

Soldering Profile (RoHS Process)

It must be noted that 32001367 module should not be allowed to be hanging upside down during the reflow operation. This means that the module has to be assembled on the side of the printed circuit board that is soldered last.
The recommendation for lead-free solder reflow in IPC/JEDEC J-STD-020D Standard should be followed.

Profile Feature	Sn-Pb Assembly	Pb-Free Assembly
Average Ramp-UP Rate (T_s max to T_p)	3 °C/s max	3 °C/s max
Preheat -Temperature Min (T_s min) -Temperature Max (T_s max) -Time (T_s min to T_s max)	 100 °C 179 °C 80-135 s	 130 °C 217 °C 80-135 s
Time maintained above: -Temperature (T_L) -Time (t_L)	 183 °C 30-90 s	 220 °C 30-90 s
Peak/Classification Temperature (T_p)	Max. peak temp. 220 °C	Max. peak temp. 250 °C
Time within 5 °C of actual peak temperature (t_p)	10-15 s	10-15 s
Ramp-Down Rate	4 °C/s max	4 °C/s max
Time 25 °C to peak temperature	6 min. max	8 min. max

Note: All temperatures refer to topside of the package, measured on the package body surface



REVISION HISTORY

Revision	Date	Description
1.2	27-08-2019	Final release

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